



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/066,149 | 01/31/2002 | Zhizhang Chen | 10017974 -1 | 3565 |

7590

02/19/2003

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, CO 80527-2400

EXAMINER

LE, DUNG ANH

ART UNIT

PAPER NUMBER

2818

DATE MAILED: 02/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/066,149

Applicant(s)

CHEN ET AL.

Examiner

DUNG A LE

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 December 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-69 is/are pending in the application.
- 4a) Of the above claim(s) 1-47 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 62-69 is/are allowed.
- 6) ☒ Claim(s) 48-51 and 53-57 is/are rejected.
- 7) ☒ Claim(s) 52 and 58-61 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Oath/Declaration

The oath/declaration filed on 1/31/2002 is acceptable.

Election/Restriction

Examiner confirms that Applicants elected to prosecute Claims 48-69, drawn to process of making a semiconductor device and have withdrawn Claims 1-47 without prejudice in Paper No. 7, is acknowledged for prosecution in the subject application . Applicants have the right to file a divisional, continuation or continuation-in-part application covering the subject matter of the non-elected claims 1-47.

Information Disclosure Statement

This office acknowledges of the following items from the Applicant:

Information Disclosure Statement (IDS) filed on 09/19/2002 and made of record as Paper No.5. The references cited on the PTOL 1449 form have been considered.

Specification

The specification is objected to for the following reason:

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed (see MPEP § 606.01).

A title such as --METHOD OF MAUFACTURING A EMMITER.-- is suggested.

A new abstract is required that is clearly indicative the invention to which the claims are directed. Note that, the claims are directed to a method of making a semiconductor device instead of to a semiconductor device.

The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections

Set of claims 48-54

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 48- 50 are rejected under 35 USC 102 (b) as being anticipated by Peng et al. (5578900).

Peng et al. disclose a method for creating an emitter having a cathode emission surface, comprising the steps of:

forming a protective layer 78 that is conductive on the cathode emission surface 74; creating an electronic lens structure over the protective layer 78; and etching the protective layer 78 to expose the cathode emission surface 74.

Regarding claim 49, an emitter created by the process of claim 48 (fig. 7).

Regarding claim 50, the step of applying the protective layer 78 further comprises the step of applying a layer of titanium or molybdenum to a thickness of about 300 to about 1500 Angstroms (col 4, lines 11- 15).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 51 and 53-54 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Peng et al. (5578900) the following remark.

Regarding claim 51, Peng et al. disclose the step of applying a cathode layer 74 on a tunneling layer 72 disposed over an electron supply 70, the cathode layer 74 including Al, Nb, Mo, but fail to disclose the cathode layer including gold or platinum.

It is known in the art that gold or platinum is commonly used to form cathode layer.

Regarding claims 53 and 54, Peng et al. the protective layer is etched, but fail to teach the protective layer is etched with sulfuric peroxide or ammonia and water wherein the sulfuric peroxide etch is performed using about 1 part H₂O and about 2 parts H₂SO₄ to create the exposed cathode emission surface. It is known in the art that sulfuric peroxide or ammonia and water is commonly used to etch protective/conductive layer.

Set of claims 55-61

Claims 55- 57 are rejected under 35 USC 102 (b) as being anticipated by Peng et al. (5578900).

Peng et al. disclose a method for creating an emitter on an electron supply, comprising the steps of:

applying a tunneling layer 72 on the electron supply; applying a cathode layer 74 on the tunneling layer 72; applying a protective layer 78 that is conductive on the cathode layer; applying an electron lens structure on the protective layer; and creating an opening in the electron lens structure and protective layer 78 to the cathode surface 74.

Regarding claim 56, emitter created by the process of claim 55 (fig. 7).

Regarding claim 57, the applied protective layer 78 is titanium or molybdenum having a thickness of about 300 to about 1500 Angstroms (col 4, lines 10-15).

Set of claims 62- 69, see Reasons for Indication of Allowable Subject Matter

Reasons for Indication of Allowable Subject Matter

Claims 52 and 58- 61 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, since the prior made of record and considered pertinent to the applicant's disclosure does not teach or suggest the claimed limitations. Peng et al. (U.S. Patent No. 5578900) and The Background of the Invention, taken individually or in combination, do not teach the claimed invention having (**Regarding claim 52**) the electronic lens structure includes a spacer layer, further comprising the step of etching the spacer layer before etching the protective layer and wherein the spacer layer etch rate and the protective layer etch rate have an etch selectivity greater than or equal to about 10:1, and (**Regarding claim 58**) the step of

creating the electron lens on the protective layer with a layer of tetraethylorthosilicate (TEOS), silicon oxides, silicon nitrides, or combinations thereof.

Claims 62- 69 would be allowed. The following is a statement of reason for the indication of allowable subject matter:

Claims 62- 69 are considered allowable since the prior made of record and considered pertinent to the applicant's disclosure does not teach or suggest the claimed limitations, taken individually or in combination, do not teach the claimed invention having creating an opening between the second conductive layer and the second protective layer; etching the second protective layer to the first conductive layer; etching the first conductive.

If Applicants are aware of better art than that which has been cited, they are required to call such to attention of the examiner.

When responding to the office action, Applicants' are advice to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dung A. Le whose telephone number is 703-306-5797. The examiner can normally be reached on Monday-Friday 8:00am-5: 30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 703-308-4910. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Dung A. Le
Examiner

